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(54) Title: SITE SPECIFIC INCORPORATION OF KETO AMINO ACIDS INTO PROTEINS

(57) **Abstract:** Compositions and methods of producing components of protein biosynthetic machinery that include orthogonal tRNAs, orthogonal aminoacyl-tRNA synthetases, and orthogonal pairs of tRNAs/synthetases, which incorporate keto amino acids into proteins are provided. Methods for identifying these orthogonal pairs are also provided along with methods of producing proteins with keto amino acids using these orthogonal pairs.